# Content Management for Digital Delivery of Agricultural Information: Redefining need of libraries in the context of digitization of theses and research reports

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**Abstract.** Universities and research institutes in the field of agriculture in India have felt the need for the development of digital databases of highly valuable documents such as theses, dissertations, research reports, package of practices, etc. and taken up projects to fulfill it. Agricultural universities and institutes of the Indian Council of Agricultural Research (ICAR) have made attempts to develop digital libraries by converting these documents. Kerala Agricultural University (KAU) has developed a database of theses and dissertations. The Indian Institute of Spices Research (IISR) also has done some digitization work. The University has made an academic regulation insisting the researchers to submit theses in digital format along with print copy. The researhers have accepted the new system for theses submission and also for information retrieval. Users prefer digital medium because of several additional benefits. The retrieval techniques provided in the database seemed to be an important criterion for accepting and using the database. But, these activities have witnessed with some drawbacks also. A follow up study was also conducted in KAU and IISR. This paper tries to evaluate the digitization programme and highlights major merits and demerits and forward suggestions for digital delivery of agricultural research information. Findings of the study have also been provided.

Keywords: Digital library, Re-defining libraries, Electronic theses and dissertations, Theses digitization, Agricultural information, Kerala Agricultural University, Indian Institute of Spices Research.

## 1 Introduction

Information is a core element in any academic and research activity. In order to achieve effective and efficient management of information

resources, we use modern information technologies. According to Osten (1994), information management is the life blood of any organization, and it is more so in organizations that depend on new generated technologies. Though the theses and research reports are very important sources of primary information, their use is limited mainly because these are not easily and widely accessible. Only a small percentage of these documents are being published in print or other medium. Since the copy right of the content of the theses is normally vested with the researcher, the policies and rules for making these documents made available to the out side users has to be framed by the universities. But, referring the theses in digital format will provide lot of benefits to the users, authors and the society in general. The user is benefited by the ease of access, use, retrieval, download, further manipulation of data, etc. The author is also benefited by the enhanced use of his research findings. The society being the end user of any research, the increased application of research outcome will cause further development of the society. Till a separate rule is being framed for publishing the theses in digital form, arrangements can be made to use the digital library of theses at least within that university or institution. A study has been conducted by the authors to evaluate the method and extend of digitization in agricultural universities and agricultural research institutes, especially in the case of its own documents such as theses and dissertations, reports, etc.

## 2 Digital Library of Theses and Research Reports

Digital libraries are libraries without walls and they can be accessed from home, school, office, plane, beach, village, street, etc. It provides access to the content in more structured manner and allows the user to search the resource easily. It can provide online, easy, ceaseless access, with multiple user access facility to electronic collections from the users' desktop or from remote Internet computers. Aregu (2001) opines that the digital libraries are credited because of the limitations of the older libraries and argues that the development of digital libraries will abandon the traditional information retrieval methods.

Research reports and doctoral theses contain some of the most current and valuable information on research activities done within universities and research institutions. But, these documents are underused as research resources. Where electronic theses and dissertations are open

access, they are used many times more often than paper theses that are available only via inter-library loan. Many universities and other organizations world over are now working hard to make theses and other research documents in digital format and make them more openly available and useful. Measures are also moving to collect the theses and reports in digital format at source. In an attempt to co-ordinate these activities, a workshop was held at the Vrije Universiteit Amsterdam in January 2006, to see what could be learned from existing examples of best practice and to see how the participants might work together in the future. The workshop was attended by repress entatives from 11 European countries and USA.

## 3 Review of Literature

Neil Jacob reports the proceedings of an invitation-only workshop on Electronic Theses and Dissertations (ETD) held at the Vrije Universiteit Amsterdam in January 2006. It revealed that in most countries, ETDs are being collected and made available, but only in few countries this is done in systematic manner at a national level. It was also remarked that the legal, copyright or plagiarism issues in sharing the ETDs has to be devolved to the first point in the chain, either the library or the author. The preservation programmes can be taken at basic level by the libraries / institutions holding ETDs. The participants shared that most countries expect to assume much greater importance in future for the sharing of theses information. Implementing semantic interoperability (eg, access via disciplines / subjects, multilingual access), it was agreed to have a single classification scheme, minimum at national level (Jacob, 2006).

Nanyang Technological University, Singapore has developed a Digital Library and set up a Digital Work Environment (DWE) for information services. Experience of this project reveals that the digital libraries should be user centered and the DWE should have web interface that allows the users to interact with the system (Meyyappan, Chowdhury, and Foo, 2001). Another study by the author proposed the need for setting up of regional information networks for establishing integrated information services in India. Mandatory guidelines and support by the national regulatory agencies such as the University Grants Commission, ICAR, etc. can win the goal of universal control and availability of research information (Francis, 1997). The Pew Internet Project's, "The Internet Goes to College", reports that nearly three-quarters (73%) of

college students said they use the Internet more than the library, whereas only nine percent said they use the library more than the Internet for information-searching. (Pew Internet Project, 2002). The OCLC White Paper on the Information Habits of College Students reports that students say their first choices among Web resources are search engines and course-specific Web sites (OCLC, 2002).

Jotwani shares the experience of knowledge dissemination in the Indian Institute of Technology, Bombay and argues that the Library portal of IIT, Bombay is one of the best examples of knowledge management which brings together all its resources and services on a single platform for convenience of its users. They have used the Library Portal for knowledge dissemination all kinds, including ETDs. M.Tech and PhD. Students can submit their theses electronically through an Intranet link provided from the website. (Jotwani, 2005).

Most academic librarians regard the library as the primary gateway to information for the university community and believe that they have a significant responsibility for information literacy instruction, specifically for the selection, use, and evaluation of multiple information resources, including Internet resources. In the presentation of collections and services on library home pages, libraries often provide inadequate paths to resources, guides for selection, evaluation and use of search engines, and other navigational tools necessary for users to make intelligent and informed choices about resources beyond those owned and licensed in the institution's collections. The fact that either the institution's or library's home page or portal is so often fail to act an effective entry point to the users or to provide relevant information. A study by Carol A. Wright, on library home pages revealed that the academic librarians consider that part of their mission is to serve as the gateway to information for their institution. A well-designed presentation of Internet-searching content is also an opportunity to help clear blurred user impressions of library resources versus Internet resources (Wright, 2004).

## 4 Digitization of Agricultural Theses and Reports

In agricultural research sector in India there are 47 ICAR Institutes, five National Bureaux, 11 Project Directorates, 33 National Research Centres and 43 Universities. In Kerala, there is only one agricultural

university and six ICAR institutes. As part of the World Bank assisted National Agricultural Technology Project (NATP), all agricultural universities and research institutes under ICAR have made efforts to digitize their theses, dissertations, research reports, etc. The KAU and ICAR Institutes functioning in Kerala also made similar efforts.

The KAU has established in 1971 by an Act of the Government of Kerala. It has a mandate for teaching, research and extension in the fields of agriculture, veterinary and animal science, diary technology, fisheries, forestry, cooperation, management, etc. KAU has a wide network of institutions spread over the entire State consisting of 10 constituent colleges and 32 research stations. The University plays a vital role in agricultural education along with technology generation and dissemination. KAU is offering professional courses in these fields right from graduate level to doctoral level. Being a multi-campus University, different academic and research programmes are offered in different campuses.

## 5 KAU Library and Information System (KAULIS)

The University Central Library of KAU was established in 1998 and the KAU Library and Information System (KAULIS) has been re-structured into a three tier system comprising of the University Library, in Main Campus of the University, College Libraries, in 10 constituent colleges and Agricultural Research Station Libraries in 32 Research Stations, spread through out the State of Kerala. The University Library is the head quarters of the KAULIS. It is an agricultural research information and documentation centre, providing specialized services to all colleges, research stations and other institutions under the university. It also acts as a referral centre for agricultural information. Hence, it provides documentation and information services to other government and non-government agencies in the state. Since, this library has been identified as a Regional Library by the ICAR, information services are also providing to the agricultural scientists through out the country.

## 6 Indian Institute of Spices Research (IISR) and NICS

The IISR, Calicut a constituent body of ICAR, has established in 1995 by merging the erstwhile National Research Centre for Spices at Calicut and Cardamom Research Centre at Appangala, Karnataka. The

IISR has been relentlessly pursuing to improve the production and productivity of spices in India by conducting and co-ordinating high quality research in various regions of the country. In order to provide research level information services, it has the facilities such as Agricultural Technology Information Centre, National Information Centre for Spices, Agricultural Research Information System and Bioinformatics Centre. The IISR library was set up to function as a national information storage and retrieval system for spices and related crops and to provide support to research workers of the institute. The infrastructure facilities of the library have been expanding continuously. National Informatics Centre on Spices (NICS) was established in 1998 and provides various various documention services. NICS is building up a rich resource base of books, journals, reprints, bound volumes and CD-ROMs. It has a resource sharing programme with CPCRI, Kasaragod and NRCC, Puttur. The library has automated a majority of its operations, including barcoding, using the Library Management Software, LIBSYS. Internet and intranet facilities are provided at the centre to get exhaustive online information. SpicE-Lib, the library website, launched during 2006, was a land mark in the development of NICS. Access points are provided to various library resources and services. Links are also provided in the web site to online journals and open access journals.

## 7 NATP on Libraries and Work of Digitization

The libraries of KAU and IISR have started subscribing new abstracting and indexing databases in CD-ROM format. Several multimedia and full text databases are also acquired in CD. KAU Library has mounted these databases on CD-Server and Juke Box for getting access to the users. To this facility, the abstract of theses are also added now. Users prefer to search online full text journals also. The CD-Image Serving System started along with is proved to be more convenient to manage databases and also to retrieve and download required information. Moreover, most of the users requested to provide orientation and hands on training on how effectively to make use of the digital resources and databases. A pilot work of digitization of abstracts of theses and dissertations were done by KAU in 1988-89 was not fully successful because of the drawbacks in retrieval efficiency, user friendliness, etc. Hence, it has modified the digital library to eliminated the setbacks earlier occurred. Enough retrieval and

navigation tools have been provided in the database created in PDF. It is possible to search the theses by title, researcher, guide, keywords, faculty, college, department, year, etc. Free text searching is also possible by any word or phrase.

IISR has initiated digitising research reports and theses using the open source software DSpace. Now, almost all agricultural universities and ICAR institutes in the country have made tremendous progress in the digitization of its information resources. One of the reasons for this progress is the availability of digital library softwares such as Greenstone, D-Space, E-Prints, etc. Another reason attributed towards this is the training programmes, conferences, workshops, discussions, etc. conducted in the area of digitization.

## 8 Academic Regulation for Collection of ETDs at Source

It is highly cost effective and efficient, if the theses, reports, articles, etc. could be collected at source in electronic format. The KAU has made a strategic plan to complete the work of digitization of theses. The KAU has made regulation in 1996 to insist the students to submit their theses in electronic format also, along with the printed document.

## 9 Present Study and Methodology

A study was conducted during 2005-06 to study the impact of digitization of agricultural research information recently done mainly under NATP. The study was limited to KAU, Thrissur and IISR, Calicut, that is, one agricultural university and one ICAR Institute. It was based mainly on observation of work procedures, user approaches, their preferences and experiences, personal interview and discussion with the library users, staff, etc. Data was collected during this period from users involved in research activities, that is, scientists, research fellows, post graduate and research students. Main objectives of the study were to find:

i. The impact of digitization of agricultural research documents recently done and the virtual delivery of this digital content to the end users through networks or websites.

ii. The perceptions and expectations of the users on the digital content of theses, dissertations, reports, etc. and network or web based delivery of this content to the users and the extent to

which the information needs of the users of the two libraries were satisfied.

iii. The scope for re-defining and re-engineering the business processes of the libraries in the context of digitization.

## 10 Findings

The study provided an opportunity to find the nature, quality, adequacy and effectiveness of digitization of agricultural research information and digital information services. It was also helpful to analyze the acceptance and usefulness of the work and necessary modification in the program could be indicated. It also highlighted the need for digital delivery of research information through library websites and also to concentrate on the promotion of the digital services by the collaboration of all agricultural university and research libraries in the country. The findings of the study can be summarized below:

i. The study reveals that the acceptance and use of digital libraries are heavily depend on user centered digital libraries. The use of ETDs has increased when the library has modified the digital library software and tools for accessing, retrieving, printing, downloading, etc. Linux based new CD Image Server System seemed to be more efficient and cost effective as compared to the earlier physical drive based CD-Server and Juke Box. At IISR the database could be accessed from repository access point given in the library website. The database has been well received by the users and they are showing increased interest to use.

ii. While 86 percent of scientists and 92 percent of students are of the opinion that reports / thesis, especially that available in other institutions, are not accessible to them. 91 percent of scientists and 93 percent of students think that digitization and web hosting of theses and reports will benefit research activities and it will enhance reference and citation of the work and thus the credibility of the scientists and institutions.

iii. Regarding the quality of research and research documents, 80 percent of scientists and 78 percent of students are of the view that the digitization and web hosting have the chance for wider

discussion on the research findings and this may indirectly improve the quality of further research and reports and theses.

iv. At the same time, 89 percent of scientists and 81 percent of students are thinking that web hosting may increase the chances of misuse of the documents and the remaining users denied such fears as baseless. Hence, as a measure to curb the misuse, the first group suggests limiting the web hosting to extended abstracts with a mechanism to provide desired portion of the document on specific request. In order to get time for proper documentation and publication of research findings and as a measure to limit misuse, 56 percent of the scientists and 43 percent of students suggested providing full text theses and reports on the web only after two to three years of its submission. At the same time they favors to make available the digital full text for reference within the respective institutions.

v.79 percent of scientists and 73 percent of students admitted the need for proper legislation, regulations and uniform guidelines for the collection, maintenance and dissemination of theses and reports at university/institution level and also at national level. Library professionals favour to do measures to collect the documents at source in digital format and also to build functional repositories.

vi. The general notion of the users is that library website is a most common and easy vehicle for the delivery of information resources and instruction materials. Yet, library Web pages often fail to serve as a gateway to these resources. Scientists as well as students have dissatisfaction on the way by which the Indian universities and research institutions providing library and information services through their websites. 92 percent of the users feel that the library websites or webpages or homepages provide inadequate information or guides or navigational tools to the library and information resources.

### 10.1 Re-engineering aspect of Digitization

Re-engineering is the radical redesign of an organization's processes, especially customer and users relationship management systems, all owe a debt to re-engineering its business processes. Rather than organizing a library into functional specialties like acquisition, classification, cataloguing, reference service, circulation, etc. and looking at the tasks that each function performs, it should be looking at complete processes from information acquisition, processing, packing, re-packing, to dissemination and servicing of information. The library should be re-engineered into a series of processes, especially in the context of Information Technologies and Digitization. This study also provided an insight into the business process re-engineering of the libraries. The increased availability of agricultural research content in digital format and the changed user approaches have necessitated a thorough re-defining and radical re-engineering of the library and information systems and its business processes. 76 percent of the library staff participated in the study disclosed the need for such a change in the library operations. They are of the view that the conventional divisions of the libraries such acquisition, classification, cataloguing, maintenance, reference service, circulation, loan, etc. have to be fully re-organised in order to achieve maximum work flow and management effectiveness. At the same time 24 percent of the staff favours the continuance of the conventional divisions of the libraries with some modifications to suit the changed work environment.

### 10.2 Library Websites for Providing Digital Information

The revolutionary shift from paper to digital documents and the changed pattern of content management and information delivery has made the library websites as an urgent necessity for effective information services. The study indicated a higher level of interest by the scientist and student users for the web based information search. 87 percent of the library users and 90 percent of library professionals clearly expressed their opinion to use library websites as an effective platform for information service. Though not clearly mentioned, the remaining users and professionals also indirectly favoured for library websites or web pages.

## 11 Discussion

The digitization and programmes for digital delivery of agricultural research information initiated by the KAU, IISR and agricultural

universities and institutions in India are in the line of actions advancing in many other countries. The preference for user centered digital information services also matches with the DWE experience of Nanyang Technological University. The study recognises the user' priority for Internet based information retrieval which is similar to that of the findings of the Pew Internet Project, OCLC, IIT, Bombay. The study stresses the need for re-defining the web sites or web pages of Indian libraries in order to transform them as an effective clearing centre of information resources.

## 12 Conclusion

The experience of the Kerala Agricultural University, Indian Institute of Spices Research and many of the agricultural universities and ICAR institutes reveal that both the content and its organization are extremely important in the case of digital libraries and web delivery of information. As the digitization necessitated re-defining the whole in-house functions of the libraries, it has resulted to re-engineer the business processes suitably. Since many of the documents such as theses, dissertations, reports, etc. are available in digital format itself, academic regulations, orders and efforts are effective to develop digital libraries and institutional repositories. Need for user friendly softwares, extensive training programmes on available softwares such as D-Space, Greenstone, etc. for both library staff and users and technical and financial support, etc. are other major factors to achieve momentum in the work of digitization and use of available digital information in university libraries.

## References:


[1] Aregu, Raphael (2001). Digitizing agricultural data for rapid agricultural modernization in Uganda: strengthening Ugandan NARS issues. In *Digital libraries: dynamic landscapes for knowledge creation, access and management*, Conference papers of the 4th International Conference of Asian Digital Libraries. (pp. 404-415) Bangalore: ICADL.

[2] Francis, A.T (1997). Regional Information Networks: necessary thrust area for INFLIBNET to establish integrated information system in India. In *Information Technology applications in Academic Libraries* edited by A.L. Murthy and P.B. Mangala. (pp. 102-106). Ahmedabad: INFLIBNET.

[3] Jacob, Neil (2006). International workshop on E-Theses. Ariadne, No.46, 08-February-2006. http://www. ariadne.ac.uk/ issue46/e-theses-rpt/intro.Html.(Accessed on 17 October 2006).

[4] Jotwani, Daulat (2005). Library portal – a knowledge management tool. In *Multilingual computing and information management in networked digital environment*. ed. Murthy T.A.V. et al (pp. 612-620). Ahmedabad: Inflibnet Centre.

[5] Meyyappan, N., Chowdhury, C.G. and Foo, S (2001). Design and development of a user – centered digital library system: some basic guidelines. In *Digital libraries: dynamic landscapes for knowledge creation, access and management*, Conference papers of the 4th International Conference of Asian Digital Libraries (pp. 135-148). Bangalore: ICADL.

[6] OCLC Online Computer Library Center, Inc. (2002), "OCLC White Paper on the Information Habits of College Students: How Academic Librarians Can Influence Students' Web-based Information Choices," June 2002. Available online from http://www5.oclc.org/downloads/community/informationhabits.pdf (Accessed 11 September 2006).

[7] Osten, Alexander Von der et al. Information policy in the CGIAR. *Quarterly bulletin of the IAAIS*, xxxix (1-2), 1994.

[8] Pew Internet Project (2002). Pew Internet and American Life, "The Internet Goes to College: How Students Are Living in the Future with Today's Technology," Sept. 15, 2002. Available online at http: //www. pewinternet.org/pdfs/PIP_College_Report. pdf (Accessed 8 August 2006).

[9] Wright, Carol A. (2004). The Academic Library as a Gateway to the Internet: An Analysis of the Extent and Nature of Search Engine Access from academic library home pages. *College & Research Libraries* May 2004, 276-286.